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(54) **MOTOR DRIVEN COMPRESSOR**

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(58) **Field of Classification Search**
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See application file for complete search history.

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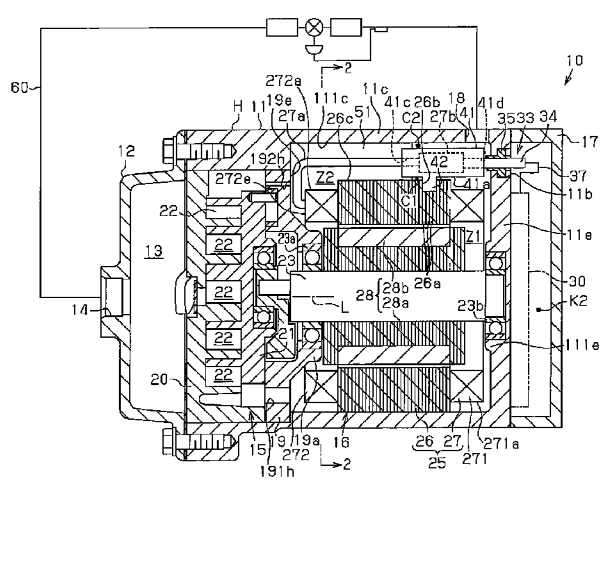
(57) **ABSTRACT**

A motor-driven compressor includes a compression unit having a compression chamber, a rotation shaft, an electric motor having a coil, a motor driving circuit, a housing, and a shaft support. The coil includes a first coil end, which is relatively close to the motor driving circuit, and a second coil end, which is relatively close to the compression unit. The housing includes a first area and a second area. A refrigerant passage communicates the first area with the second area. The shaft support includes a guide wall that guides the refrigerant to flow along the radial outer surface of the second coil end. The refrigerant guided by the guide wall is drawn into the compression chamber from the second area through a first suction passage. The first suction passage and the refrigerant passage are arranged at opposite sides of the rotation shaft.

4 Claims, 3 Drawing Sheets



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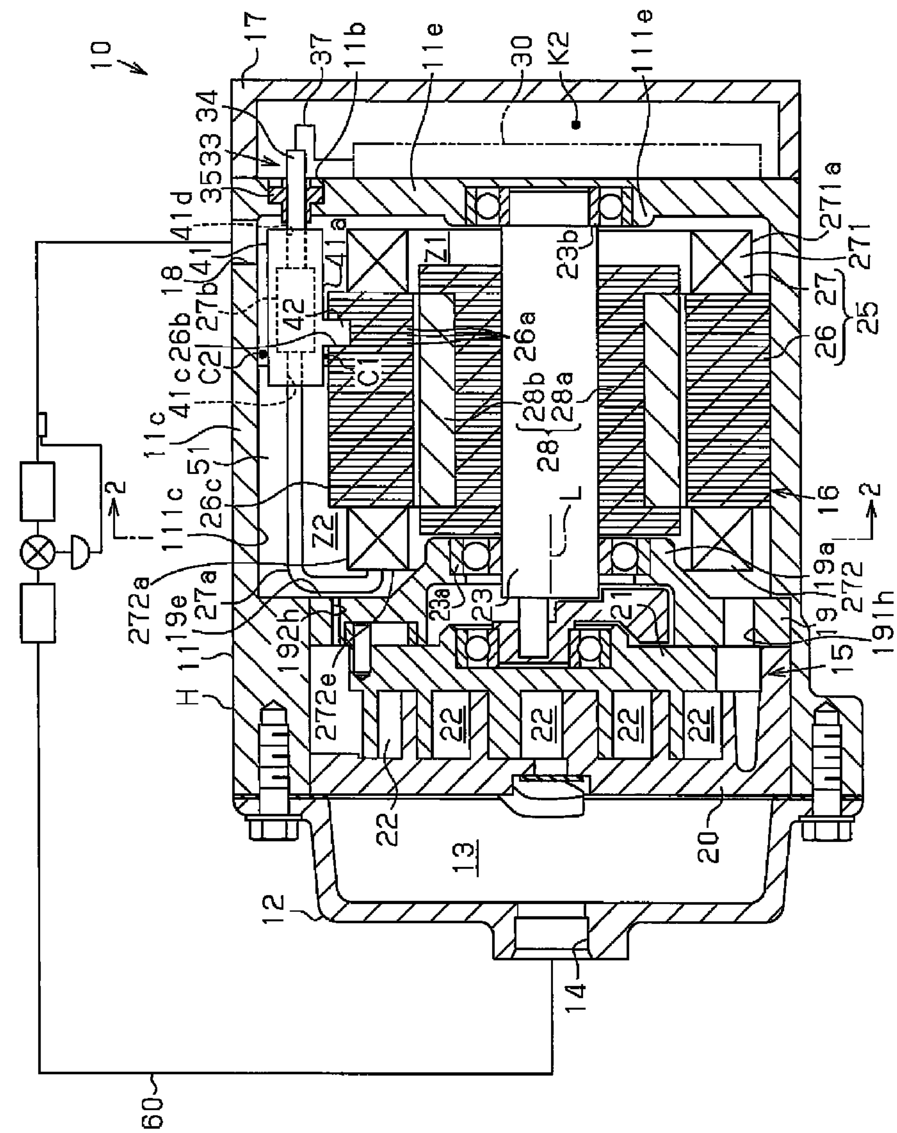
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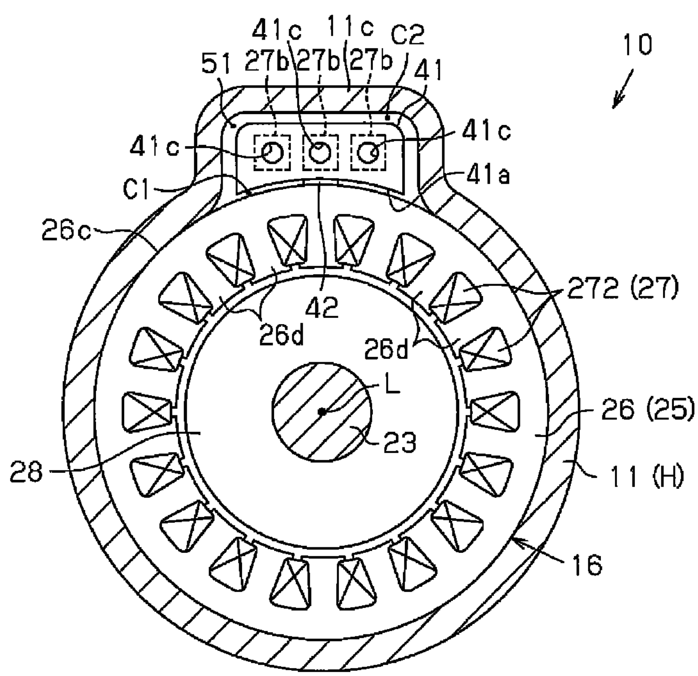
Fig.1

Fig.2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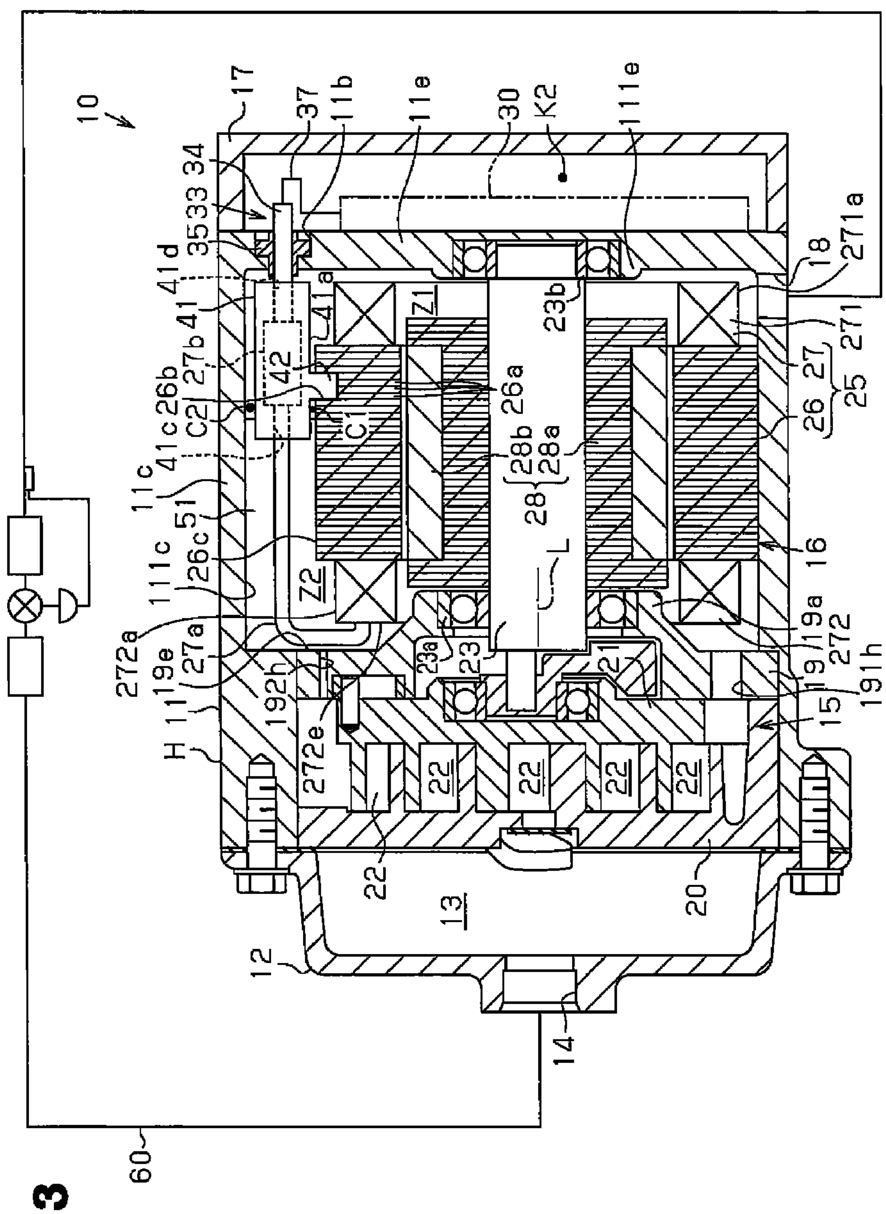

Fig. 3

MOTOR DRIVEN COMPRESSOR

BACKGROUND OF THE INVENTION

The present invention relates to a motor-driven compressor that includes a compression unit, an electric motor, and a motor driving circuit, which are arranged in this order along the axial direction of a rotation shaft.

Japanese Laid-Open Patent Publication No. 2005-201108 discloses a motor-driven compressor. The motor-driven compressor includes a housing accommodating an electric motor and a scroll compression unit. The electric motor drives the compression unit that compresses a fluid (refrigerant). The housing includes a first fluid passage located between the outer surface of the electric motor and the inner surface of the housing. The housing also includes a partition that separates the electric motor from the fluid and guides the fluid to the first fluid passage. The partition guides the fluid drawn into the housing near the electric motor to the first fluid passage. The fluid flowing in the first fluid passage absorbs heat from the electric motor.

In the motor-driven compressor, the compression unit, electric motor, and motor driving circuit are arranged along the axial direction of the rotation shaft. This increases the overall axial size of the motor-driven compressor. The axial size can be reduced by reducing the size of the electric motor, for example. However, to maintain the performance of the electric motor while reducing the size, a large amount of current needs to be applied to coils that are wound around teeth of a stator core that the electric motor includes. This increases the heat generated by the coils. Each coil includes an end located near the compression unit. Thus, the compression unit may heat the ends of the coils to a high temperature.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a motor-driven compressor that effectively cools a coil end of an electric motor located near a compression unit.

To achieve the above object, one aspect of the present invention is a motor-driven compressor includes a compression unit that includes a compression chamber and compresses refrigerant in the compression chamber, a rotation shaft that rotates to drive the compression unit, an electric motor that drives the rotation shaft and includes a stator core, which includes teeth, and a coil, which is wound around the teeth, a motor driving circuit that drives the electric motor, a housing accommodating the compression unit, the electric motor, and the motor driving circuit, which are arranged in this order along an axial direction of the rotation shaft, and a shaft support that is arranged between the electric motor and the compression unit and rotatably supports the rotation shaft. The stator core is fixed to the housing. The coil includes a first coil end, which is relatively close to the motor driving circuit, and a second coil end, which is relatively close to the compression unit. The housing includes a first area, which accommodates the first coil end, and a second area, which accommodates the second coil end. The housing includes a suction port that opens to the first area and is connected to an external refrigerant circuit. A refrigerant passage is formed between the stator core and the housing and communicates the first area with the second area. The second coil end includes an axial end surface and a radial outer surface. The shaft support includes a guide wall that faces the axial end surface of the second coil end and guides the refrigerant flowing into the second area from the refrigerant passage so that the refrigerant flows along the radial outer surface of the second coil end.

A first suction passage is arranged in the housing. The refrigerant guided by the guide wall is drawn into the compression chamber from the second area through the first suction passage. The first suction passage and the refrigerant passage are arranged at opposite sides of the rotation shaft.

Other aspects and advantages of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

FIG. **1** is a cross-sectional side view showing a motor-driven compressor of one embodiment;

FIG. **2** is a cross-sectional view taken along line **2-2** in FIG. **1**; and

FIG. **3** is a cross-sectional side view showing a motor-driven compressor of another embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1** and **2**, one embodiment of a motor-driven compressor for a vehicle air-conditioning device will now be described.

As shown in FIG. **1**, a motor-driven compressor **10** includes a housing H that includes a motor housing member **11** and a discharge housing member **12**. The motor housing member **11** is made of metal (aluminum in the present embodiment), cylindrical, and has one closed end. The discharge housing member **12** is connected to the open end (left end as indicated in FIG. **1**) of the motor housing member **11**. The discharge housing member **12** is made of metal (aluminum in the present embodiment), cylindrical, and has one closed end. The discharge housing member **12** forms a discharge chamber **13**. The motor housing member **11** includes an end wall **11***e* connected to an inverter cover **17**. The inverter cover **17** is made of metal (aluminum in the present embodiment), cylindrical, and has one closed end.

The motor housing member **11** accommodates a rotation shaft **23**, a compression unit **15**, which compresses a refrigerant, and an electric motor **16**, which drives the compression unit **15**. The compression unit **15** and electric motor **16** are arranged next to each other along the axis L of the rotation shaft **23** (along the axial direction of the rotation shaft **23**). The electric motor **16** is closer to the end wall **11***e* of the motor housing member **11** (right side as viewed in FIG. **1**) than the compression unit **15**. In addition, the end wall **11***e* of the motor housing member **11** and the inverter cover **17** define a cavity to accommodate a motor driving circuit **30** that drives the electric motor **16** as indicated by the double-dashed lines in FIG. **1**. The motor driving circuit **30** is in close contact with and thermally coupled to the end wall **11***e*. In the present embodiment, the compression unit **15**, the electric motor **16**, and the motor driving circuit **30** are arranged in this order along the axis L of the rotation shaft **23**.

The compression unit **15** includes a fixed scroll **20**, which is fixed in the motor housing member **11**, and a movable scroll **21**, which is engaged with the fixed scroll **20**. The fixed scroll **20** and the movable scroll **21** form a compression chamber **22** that has a variable volume. A cylindrical shaft support **19**, which supports one end of the rotation shaft **23**, is arranged between the electric motor **16** and the compression unit **15** in the motor housing member **11**. The shaft support **19** includes a bearing holding portion **19***a*. The bearing holding portion **19***a* holds a radial bearing **23***a* that rotatably supports one end of the rotation shaft **23**. In addition, the end wall **11***e* includes a shaft supporting portion **111***e*. The shaft supporting portion **111***e* holds a radial bearing **23***b* that rotatably supports the other end of the rotation shaft **23**. The rotation shaft **23** is supported by the radial bearings **23***a* and **23***b* to be rotatable relative to the shaft support **19** and the end wall **11***e* of the motor housing member **11**.

A stator **25** is fixed to the inner circumferential surface of the motor housing member **11**. The stator **25** includes an annular stator core **26** and coils **27**. The stator core **26** is fixed to the inner circumferential surface of the motor housing member **11** and includes teeth **26***d* (see FIG. **2**). The coils **27** are wound around the teeth **26***d*. Each coil **27** includes a first end **271**, which is relatively close to the motor driving circuit **30**, and a second end **272**, which is relatively close to the compression unit **15**. In the description below, the first end **271** of the coil **27** is also referred to as a first coil end **271**, and the second end **272** is also referred to as a second coil end **272**. The stator core **26** includes a plurality of laminated magnetic core plates **26***a* (electromagnetic metal plates). The stator core **26** has an outer circumferential surface **26***c* including an insertion recess **26***b*. The insertion recess **26***b* is formed by cutting out parts from the outer circumferences of some of the core plates **26***a* (four plates in the present embodiment). A rotor **28** is arranged in the stator **25**. The rotor **28** includes a rotor core **28***a*, which is fixed to the rotation shaft **23**, and a plurality of permanent magnets **28***b* arranged on the periphery of the rotor core **28***a*.

The motor housing member **11** has an upper part including a passage-forming portion **11***c* that projects radially outward. The passage-forming portion **11***c* extends linearly along the axis L of the rotation shaft **23** and has an inner surface **111***c*. The inner surface **111***c* and the outer circumferential surface **26***c* of the stator core **26** define a refrigerant passage **51** in the passage-forming portion **11***c*. The present embodiment includes only one refrigerant passage **51**. The motor housing member **11** also includes a suction port **18**. The suction port **18** opens to a first area Z**1** that accommodates the first coil ends **271**. The suction port **18** is located above the rotation shaft **23** in a gravitational direction and connected to an external refrigerant circuit **60**. In addition, the discharge housing member **12** has an end wall (left end as viewed in FIG. **1**) including a discharge port **14**. The discharge port **14** is connected to the external refrigerant circuit **60**.

The refrigerant passage **51** connects the first area Z**1** to a second area Z**2** of the motor housing member **11** that accommodates the second coil ends **272**. The first area Z**1** is a cavity defined by the end wall **11***e* and first end surfaces of the stator core **26** and the rotor core **28***a* that face the end wall **11***e*. The first area Z**1** accommodates the entire first coil ends **271**. The second area Z**2** is a cavity defined by the shaft support **19** and second end surfaces of the stator core **26** and the rotor core **28***a* that face the shaft support **19**. The second area Z**2** accommodates the entire second coil ends **272**.

As shown in FIG. **2**, the refrigerant passage **51** accommodates a rectangular cluster block **41**, which is made of a synthetic resin. The cluster block **41** accommodates connection terminals **27***b*. The cluster block **41** includes an outer bottom surface **41***a*, which is arcuate in conformance with the outer circumferential surface **26***c* of the stator core **26** and extends along the axial direction of the stator core **26**.

As shown in FIG. **1**, the outer bottom surface **41***a* of the cluster block **41** includes a coupling boss **42**. The coupling boss **42** is fitted to the insertion recess **26***b* to couple the cluster block **41** to the outer circumferential surface **26***c* of the stator core **26**. When the cluster block **41** is coupled to the outer circumferential surface **26***c* of the stator core **26**, a gap C**1** is formed between the outer bottom surface **41***a* of the cluster block **41** and the outer circumferential surface **26***c* of the stator core **26**, and a gap C**2** is formed between the cluster block **41** and the inner surface **111***c* of the passage-forming portion **11***c*.

Leads **27***a* of U, V, and W phases (only one lead shown in FIG. **1**) extend from the second coil ends **272** toward the refrigerant passage **51**. The leads **27***a* extend through first insertion bores **41***c* of the cluster block **41** and are connected to the connection terminals **27***b*. Accordingly, the leads **27***a* partially extend through the refrigerant passage **51**.

The end wall **11***e* of the motor housing member **11** includes a through hole **11***b*, which receives a sealing terminal **33**. The sealing terminal **33** includes three sets of a metal terminal **34** and a glass insulator **35** (only one set shown in FIG. **1**). The metal terminals **34** are electrically connected to the motor driving circuit **30**. Each glass insulator **35** fixes the corresponding metal terminal **34** to the end wall **11***e* and insulates the metal terminal **34** from the end wall **11***e*. Each metal terminal **34** has a first end electrically connected to the motor driving circuit **30** by a cable **37**. Each metal terminal **34** extends toward the refrigerant passage **51** and has a second end that is inserted into the cluster block **41** through a second insertion bore **41***d* of the cluster block **41** and electrically connected to the corresponding connection terminal **27***b*.

The shaft support **19** includes a guide wall **19***e* on the side that faces the second area Z**2**. The guide wall **19***e* generally faces axial end surfaces **272***e* of the second coil ends **272**. Part of the guide wall **19***e* projects into the second coil ends **272**. Accordingly, the bearing holding portion **19***a* is located in the second coil ends **272** and is surrounded by the second coil ends **272**. The portion of the guide wall **19***e* that directly faces the end surfaces **272***e* of the second coil ends **272** is located adjacent to the end surfaces **272***e*.

The shaft support **19** has a peripheral portion with a lower section including a first through hole **191***h*. The first through hole **191***h* is in communication with the space located at the outer side of the movable scroll **21**. In addition, the first through hole **191***h* communicates the compression chamber **22** with a portion of the second area Z**2** that is below the rotation shaft **23** in the gravitational direction. The refrigerant flowing through the second area Z**2** below the rotation shaft **23** is drawn into the compression chamber **22** through the first through hole **191***h*. In the present embodiment, the first through hole **191***h* functions as a first suction passage.

The peripheral portion of the shaft support **19** has an upper section including a second through hole **192***h*. The second through hole **192***h* is in communication with the space located outside the movable scroll **21**. The through hole **192***h* communicates the compression chamber **22** with the upper portion of the second area Z**2**. The refrigerant flowing into the second area Z**2** from the outlet of the refrigerant passage **51** is drawn into the compression chamber **22** through the second through hole **192***h*. In the present embodiment, the second through hole **192***h* functions as a second suction passage.

The outlet of the refrigerant passage **51** and the first through hole **191***h* are arranged at the opposite sides of the rotation shaft **23**, and the refrigerant passage **51** and the second through hole **192***h* are arranged at the opposite sides of the rotation shaft **23**.

The first through hole **191***h* has a larger passage area than the second through hole **192***h*. Thus, the refrigerant flowing in the second area Z**2** is more likely to be drawn into the first through hole **191***h* than into the second through hole **192***h*.

Accordingly, more refrigerant flows through the first through hole **191***h* than the second through hole **192***h*.

The operation of the present embodiment will now be described.

In the motor-driven compressor **10**, when power, which is controlled by the motor driving circuit **30**, is supplied to the electric motor **16**, the rotor **28** and the rotation shaft **23** rotate at a controlled rotation speed. This decreases the volume of the compression chamber **22** formed by the fixed scroll **20** and the movable scroll **21** in the compression unit **15**. The refrigerant is drawn in the first area Z1 of the motor housing member **11** from the external refrigerant circuit **60** through the suction port **18**. The refrigerant drawn in the first area Z1 is divided into the refrigerant that is guided by the end wall **11***e* and flows along the radial outer surfaces **271***a* of the first coil ends **271** and the refrigerant that flows to the second area Z2 through the refrigerant passage **51**. Here, the refrigerant passage **51** functions as a main refrigerant passage for the refrigerant flowing from the first area Z1 to the second area Z2.

Each first coil end **271** is cooled by the refrigerant flowing along the radial outer surfaces **271***a* of the first coil ends **271**. The refrigerant guided by the end wall **11***e* flows along the radial outer surfaces **271***a* of the first coil ends **271**. Thus, the refrigerant cools the end wall **11***e* and the motor driving circuit **30**, which is thermally coupled to the end wall **11***e*.

The refrigerant flowing into the second area Z2 through the outlet of the refrigerant passage **51** is divided into the refrigerant that is drawn into the compression chamber **22** through the second through hole **192***h* and the refrigerant that is guided by the guide wall **19***e* and flows along the radial outer surfaces **272***a* of the second coil ends **272**. The refrigerant sent to the compression chamber **22** through the second through hole **192***h* is compressed in the compression chamber **22** and discharged into the discharge chamber **13**.

The first through hole **191***h* has a larger passage area than the second through hole **192***h*. Thus, the refrigerant flowing through the second area Z2 is more likely to be drawn into the first through hole **191***h* than into the second through hole **192***h*. Accordingly, the amount of refrigerant that is guided by the guide wall **19***e* and flows along the radial outer surfaces **272***a* of the second coil ends **272** is greater than the amount of the refrigerant that flows toward the second through hole **192***h*.

The refrigerant flowing along the radial outer surfaces **272***a* of the second coil ends **272** cools the second coil ends **272**. Here, the portion of the shaft support **19** that projects into the second coil ends **272** limits the flow of refrigerant into the second coil ends **272**. This further enhances the flow of refrigerant along the radial outer surfaces **272***a* of the second coil ends **272**. After flowing along the radial outer surfaces **272***a*, the refrigerant is drawn into the compression chamber **22** from the portion of the second area Z2 that is located below the rotation shaft **23** in the gravitational direction through the first through hole **191***h*. The refrigerant is compressed in the compression chamber **22** and then discharged into the discharge chamber **13**. The discharged refrigerant in the discharge chamber **13** flows through the discharge port **14** into the external refrigerant circuit **60** and returns to the motor housing member **11**.

The advantages of the present embodiment will now be described.

(1) The refrigerant passage **51**, which communicates the first and second areas Z1 and Z2, is arranged between the stator core **26** and the motor housing member **11**. In addition, the shaft support **19** includes the guide wall **19***e* that guides the refrigerant flowing into the second area Z2 from the outlet of the refrigerant passage **51** so that the refrigerant flows along the radial outer surfaces **272***a* of the second coil ends **27**. Further, the refrigerant guided by the guide wall **19***e* is drawn into the compression chamber **22** from the second area Z2 through the first through hole **191***h*. Accordingly, the refrigerant that is drawn into the first area Z1 through the suction port **18** flows at least along the radial outer surfaces **272***a* of the second coil ends **272** before being sent to the compression chamber **22**. The refrigerant thus effectively cools the second coil ends **272**.

(2) The motor-driven compressor **10** includes the second through hole **192***h* in addition to the first through hole **191***h*. The second through hole **192***h* and the first through hole **191***h* are located at opposite sides of the rotation shaft **23**. The first through hole **191***h* has a larger passage area than the second through hole **192***h*. Accordingly, the amount of the refrigerant sent to the compression chamber **22** through the first through hole **191***h* after flowing along the radial outer surfaces **272***a* of the second coil ends **272** is greater than the refrigerant that is sent to the compression chamber **22** through the second through hole **192***h* without flowing along the radial outer surfaces **272***a*. The refrigerant thus effectively cools the second coil ends **272**. Further, in addition to the first through hole **191***h*, the refrigerant is sent to the compression chamber **22** through the second through hole **192***h*. This allows for efficient suction of refrigerant into the compression chamber **22**. A structure including the two suction passages of the first and second through holes **191***h* and **192***h* is suitable for scroll compressors such as that of the present embodiment.

(3) The electric motor **16** and the compression unit **15** are arranged next to each other in the motor-driven compressor **10**, and the first through hole **191***h* is in communication with the portion of the second area Z2 located below the rotation shaft **23** in the gravitational direction. The first through hole **191***h* communicates the compression chamber **22** with the portion of the second area Z2 below the rotation shaft **23** in the gravitational direction. Thus, lubricant oil from the refrigerant collected in the second area Z2 below the rotation shaft **23** and a liquid mixture of the lubricant oil and the liquefied refrigerant remaining in the second area Z2 below the rotation shaft **23** in the gravitational direction are drawn into the compression chamber **22** through the first through hole **191***h*. This avoids accumulation of the lubricant oil and the liquid mixture in the second area Z2 below the rotation shaft **23**. Since the coils are not immersed in lubricant oil and liquid mixture, current leakage is suppressed.

(4) The cluster block **41**, which electrically connects the electric motor **16** and the motor driving circuit **30**, is arranged in the refrigerant passage **51**. Thus, the refrigerant flowing through the refrigerant passage **51** cools the cluster block **41**.

(5) The guide wall **19***e* partially projects toward into the second coil ends **272** so that the bearing holding portion **19***a* is surrounded by the second coil ends **272**. The portion of the guide wall **19***e* projecting into the second coil ends **272** obstructs the flow of refrigerant into the second coil ends **272**. This allows the refrigerant to flow further smoothly along the radial outer surfaces **272***a* of the second coil ends **272**. In addition, the second coil ends **272** surrounds the bearing holding portion **19***a*. This reduces the size of the motor-driven compressor **10** in the axial direction of the rotation shaft **23** as compared to a compressor structure in which the bearing holding portion **19***a* is located at the outer side of the end surfaces **272***e* of the second coil ends **272**.

(6) The present embodiment effectively cools the first coil ends **271** with the refrigerant that is guided by the end wall **11***e* and flows along the radial outer surfaces **271***a* of the first coil ends **271**.

(7) In the present embodiment, the refrigerant that is guided by the end wall **11***e* and flows along the radial outer surfaces **271***a* of the first coil ends **271** cools the end wall **11***e*. This allows for cooling of the motor driving circuit **30**, which is thermally coupled to the end wall **11***e*.

(8) The present embodiment includes only one refrigerant passage **51** between the first and second areas Z**1** and Z**2**. Accordingly, the refrigerant passage **51** serves as the main refrigerant passage and receives a large portion of refrigerant from the suction port **18** and the first area Z**1**. Thus, a large portion of refrigerant flows along the radial outer surfaces **272***a* of the second coil ends **272** after flowing through the refrigerant passage **51**. This effectively cools the second coil ends **272**.

It should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. Particularly, it should be understood that the present invention may be embodied in the following forms.

As shown in FIG. **3**, the suction port **18** and the refrigerant passage **51** may be arranged at opposite sides of the rotation shaft **23**. The suction port **18** is arranged in the motor housing member **11** below the rotation shaft **23** in the gravitational direction and opens to the first area Z**1**. In this embodiment, the refrigerant that is drawn into the first area Z**1** through the suction port **18** flows along the radial outer surfaces **271***a* of the first coil ends **271** toward the refrigerant passage **51**. The refrigerant then flows into the second area Z**2** through the refrigerant passage **51** and is guided by the guide wall **19***e* to flow along the radial outer surfaces **272***a* of the second coil ends **272**. The refrigerant thus effectively cools the first coil ends **271** and the second coil ends **272**.

In the present embodiment, the entire suction port **18** opens to the first area Z**1**. However, the suction port **18** may only partially open to the first area Z**1**.

The first and second through holes **191***h* and **192***h* may be formed in the motor housing member **11**.

The inlet of the refrigerant passage **51** may be located in the first area Z**1** below the rotation shaft **23** in the gravitational direction, and the outlet of the refrigerant passage **51** may be located in the second area Z**2** above the rotation shaft **23**.

More than one passage may be arranged between the first and second areas Z**1** and Z**2** provided that the refrigerant passage **51** receives the largest portion of the refrigerant that is drawn in the first area Z**1** through the suction port **18** and flows to the second area Z**2**.

More than one passage may guide the refrigerant in the second area Z**2** to the compression chamber **22** provided that the first through hole **191***h* has a larger passage area than other passages.

The second through hole **192***h* may be omitted.

The cluster block **41** does not have to be coupled to the outer circumferential surface **26***c* of the stator core **26**.

The cluster block **41** does not have to be arranged in the refrigerant passage **51**.

In the motor housing member **11**, the electric motor **16** and the compression unit **15** may be tilted in the vertical direction at an angle of 10° relative to a horizontal axis and arranged next to each other.

In the motor housing member **11**, the electric motor **16** and the compression unit **15** may be arranged vertically along a line perpendicular to the horizontal axis.

The motor driving circuit **30** may be coupled to the inverter cover **17** in the cavity defined by the end wall **11***e* of the motor housing member **11** and the inverter cover **17**. Since the end wall **11***e* and the inverter cover **17** are thermally coupled, the end wall **11***e* cooled by the refrigerant cools the inverter cover **17**. Thus, the motor driving circuit **30** is cooled.

The guide wall **19***e* does not have to include a portion that projects into the second coil ends **272**, and the bearing holding portion **19***a* does not have to be located in the second coil ends **272**. That is, the bearing holding portion **19***a* may be located outside the end surfaces **272***e* of the second coil ends **272**.

The compression unit **15** may be of a piston type or a vane type.

Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope and equivalence of the appended claims.

The invention claimed is:

1. A motor-driven compressor comprising:
- a compression unit that includes a compression chamber and compresses refrigerant in the compression chamber;
- a rotation shaft that rotates to drive the compression unit;
- an electric motor that drives the rotation shaft and includes a stator core, which includes teeth, and a coil, which is wound around the teeth;
- a motor driving circuit that drives the electric motor;
- a housing accommodating the compression unit, the electric motor, and the motor driving circuit, which are arranged in this order along an axial direction of the rotation shaft; and
- a shaft support that is arranged between the electric motor and the compression unit and rotatably supports the rotation shaft, wherein
- the stator core is fixed to the housing,
- the coil includes a first coil end and a second coil end, the first coil end closer to the motor driving circuit than the second coil end, and the second coil end, closer to the compression unit than the first coil end
- the housing includes a first area, which accommodates the first coil end, and a second area, which accommodates the second coil end,
- the housing includes a suction port that opens to the first area and is connected to an external refrigerant circuit,
- a refrigerant passage is formed between the stator core and the housing and communicates the first area with the second area,
- the second coil end includes an axial end surface and a radial outer surface,
- the shaft support includes a guide wall that faces the axial end surface of the second coil end and is configured to guide the refrigerant flowing into the second area from the refrigerant passage so that the refrigerant flows along the radial outer surface of the second coil end,
- the shaft support includes a bearing holding portion that holds a bearing, which rotatably supports the rotation shaft,
- a portion of the guide wall projects into the second coil end so that the bearing holding portion is surrounded by the second coil end;
- a first suction passage and a second suction passage are arranged in the housing,
- the refrigerant guided by the guide wall is drawn into the compression chamber from the second area through the first suction passage,
- the second suction passage is configured to draw the refrigerant from the refrigerant passage flowing through the second area into the compression chamber together with the first suction passage,

the first suction passage and the refrigerant passage are arranged at opposite sides of the rotation shaft,

second suction passage and the first suction passage are arranged at opposite sides of the rotation shaft, and

the first suction passage has a larger passage area than the second suction passage.

2. The motor-driven compressor according to claim **1**, wherein

the electric motor and the compression unit are arranged next to each other, and

the first suction passage is in communication with a portion of the second area that is located below the rotation shaft and on the opposite side of the rotation shaft from the refrigerant passage.

3. The motor-driven compressor according to claim **1**, further comprising a cluster block that is arranged in the refrigerant passage and electrically connects the electric motor to the motor driving circuit.

4. The motor-driven compressor according to claim **1**, wherein the suction port and the refrigerant passage are arranged at opposite sides of the rotation shaft.

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